NPIC/PPBS/PPD-18/70
8 October 1970

MEMORANDUM FOR: Executive Director, NPIC

THROUGH : Chief, Support Staff/NPIC
Chief, Planning, Programming & Budgeting Staff/NPIC

SUBJECT : Contact Lenses for Photo Interpretation

REFERENCES : a. Memorandum PIC/D-63-60, dated 11 May 1960, SUBJECT: Contact Lenses for PIC Personnel.

b. Memorandum OGC 60-0709A, dated 29 June 1960, SUBJECT: Contact Lenses for PIC Personnel.

c. Letter from Acting Director, Central Intelligence to the Comptroller General, dated 2 July 1960.

d. Letter from Comptroller General to Director Central Intelligence, dated 21 July 1960.

e. Staff Study entitled "Eyepoint of Wide-field, High Power Anamorphic Stereoviewer".

1. The purpose of this memorandum is to summarize the contact lens situation during 1960 (which led to the Comptroller General ruling in Reference d. that CIA could purchase contact lenses for those photo interpreters on board and fully qualified at the time of the ruling, but that it could not purchase the lenses in the future) and to put that situation in perspective with the current situation at NPIC. As a result of the facts as presented below, I think that it can be concluded that we overstated our case in 1960 and, consequently, today it will be very difficult to achieve our objective essentially because the case we must make today has been argued already and those dire consequences predicted as a result of inaction did not occur.

2. In 1960, it was discovered within the Photographic Interpretation Center (PIC) that individuals wearing eyeglasses had difficulty operating the new optical systems (microscopes). The primary problem was that eyeglasses prevented the photo interpreter from getting his eyes close enough to the microscope eyepiece in order to position his eyes in the exit pupil of the instrument. This restricted the field-of-view so that in some instances the edges of the scene could not be seen. While the precise amount of field loss depended upon the type of eyeglasses (i.e., type of frame, thickness of lens, curvature of lens, etc.), in the majority of the cases the amount of loss was comparatively small. The various solutions to this problem were documented in Reference a.

3. That document accurately stated the basic problem: "to increase the efficiency of PIC personnel who wear eyeglasses and are required to use tubular optical devices in their work." Two examples were cited that contributed to the loss in efficiency: (1) the reduced field of view requiring more movement of the film to see the complete target, and (2) stray light introduced from room lighting because the eyeglass wearer could not use the eye cup light shields. The study recommended purchasing contact lenses for those P.I.'s wearing eyeglasses.

4. A memorandum (Reference b.), based upon the information in Reference a., was then written by the General Counsel, with concurrences from PIC, the CIA Comptroller and the DD(S). Attached to Reference b. was a letter (Reference c.), for the acting Director's signature, to the Comptroller General requesting permission to purchase the contact lenses. In my opinion, it was this letter which overstated the case because it took the fairly specific facts of the two previous documents and (1) stated them as generalized conclusions and (2) exaggerated the criticality of the need. Probably this was done for two reasons, the first because of the sensitivity at that time of the PI operation at CIA and second to strengthen the justification for the purchase of the lenses. In hindsight, I think that the case was overstated specifically by the following three statements:

> a. "This Agency is replacing the equipment with new machinery of improved design which cannot be used effectively while the operator is wearing conventional eyeglasses."
>
> b. "The Agency's continuing replacement of its old equipment with the new, more efficient apparatus, capable of producing a finer quality of work, is creating new conditions which are making those seasoned employees, who were fully qualified when assigned originally to their specialized duties, increasingly unable to fulfill their assignments."
>
> c. "Yet without such lenses these employees will soon become so ineffective as not to be able to continue in their specializations.
>
> "In short, since the operation of this new special equipment has become a necessary part of the duties of these experts which cannot be fulfilled while wearing ordinary eyeglasses, the Agency's mission in this special area can no longer be accomplished expeditiously and satisfactorily without fitting these employees with contact lenses."

I say that I think the case was overstated because contact lenses were

not requested by or furnished to any PI at that time and yet today NPIC is operating -- I think successfully -- with more eyeglass-wearing PI's than ever before. While the effectiveness and efficiency of these employees is not precisely known, I think it is reasonable to conclude that their performance is at least satisfactory.

5. Currently the situation at NPIC is that we are developing a microscope, with a wider field-of-view than any previous instrument, but the eyeglass-wearing PI will not be able to take advantage of the larger field-of-view because he cannot get his eye close enough to the eyepiece (in the exit pupil of the eyepiece). Because of the increased field of view, it will be even more difficult for the operator to get his eye in the exit pupil and as a consequence the eyeglass wearing PI will achieve better results by using existing microscopes because the field of view he can achieve while wearing eyeglasses will be even less than that achieved with existing instruments.

6. The current problem then is no different in kind than that of 10 years ago. Unfortunately, however, the generalized and exaggerated justification accompanying the 1960 request to purchase contact lenses may complicate our situation today. While the current problem is not different in kind, the magnitude of the problem will certainly be greater than any experienced over the past 10-year period. A full discussion of the problems associated with the instrument under development is contained in Reference e. While the seriousness of a slight loss in the area viewed may not have been dramatic enough to cause the PI's to request lenses, the loss of a substantial portion of the field-of-view probably will. Over half of the photo interpreters now wear glasses; to equip them with contact lenses would cost less than 1% of the estimated procurement cost of the instrument and should significantly add to their capability to perform their tasks.

7. These past events and our current situation, may influence your decision to reopen the matter at this time. If you have questions which have not been answered by the above summary, I would be most happy to try to provide those answers or to take any further action that is required.

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[redacted]

Plans & Programs Division, PPBS
NPIC

Attachment:
References as stated.

NPIC/PPBS/PPD-18/70

Distribution:
1 - NPIC/ODIR
1 - NPIC/SS
1 - NPIC/PPBS
2 - NPIC/PPBS/PPD

TAB

TRANSMITTAL SLIP	DATE 18 May 1960
TO: Office of General Counsel Attn: [redacted]	25X1
ROOM NO. 221	East

REMARKS:

Please review the attached request and advise whether there are legal ramifications involved.

FROM: Special Assistant to the DD/S

ROOM NO.	BUILDING	
126	East	25X1 [redacted]

FORM NO. 1 FEB 55 241 REPLACES FORM 36-8 WHICH MAY BE USED (47)

SENDER WILL CHECK CLASSIFICATION TOP AND BOTTOM

UNCLASSIFIED	CONFIDENTIAL	X	SECRET

CENTRAL INTELLIGENCE AGENCY

OFFICIAL ROUTING SLIP

TO	NAME AND ADDRESS	INITIALS	DATE
1	Asst. to DD/I (Admin)	[illegible]	5/1[illegible]
2	DD/S - 12 ([illegible])		
3			
4			
5			
6			

	ACTION		DIRECT REPLY		PREPARE REPLY
	APPROVAL		DISPATCH		RECOMMENDATION
	COMMENT		FILE		RETURN
	CONCURRENCE		INFORMATION		SIGNATURE

Remarks:

Von:

Per our telephone conversation, attached are the finished copies of the Contact Lenses Staff Study.

Al

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FROM: NAME, ADDRESS AND PHONE NO.	DATE
25X1 [redacted], 605 Steuart	12 May 1960

UNCLASSIFIED	CONFIDENTIAL	X	SECRET

FORM NO. 237 Replaces Form 30-4 which may be used. 1 APR 55 (40)

U. S. GOVERNMENT PRINTING OFFICE : 1955 -- O -342531

60-3590

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REFERENCE a.

PIC/D-63-60
11 May 1960

MEMORANDUM FOR: Deputy Director (Support)

THROUGH: Deputy Director (Intelligence)

SUBJECT: Contact Lenses for PIC Personnel

1. PROBLEM:

To increase the efficiency of PIC personnel who wear eyeglasses and are required to use tubular optical devices in their work.

2. FACTS BEARING ON THE PROBLEM:

a. Success in exploiting intelligence from photography is directly related to the ability of Intelligence Officers to see images on the viewing surface.

b. New and improved high magnification devices are being developed and purchased for the Photographic Intelligence Center in order to fully exploit existing photography for intelligence information. These devices utilize to an increasing extent closed optical systems of tubular design, both monocular and binocular.

c. PIC has a large investment in tubular optical devices, and is continuing to develop them as the state of the art advances.

d. These devices pose special viewing problems for Intelligence Officers who are required to wear eyeglasses to achieve normal eyesight.

3. DISCUSSION:

a. As a result of the better image quality derived from photographic collection systems, PIC is utilizing to an increasing extent high magnification devices for full and complete exploitation of existing intelligence imagery. The requisite magnifications (10, 20, 30 or 50 diameters) have brought about a greater reliance on closed optical systems of tubular design. The total cost of such devices now on hand in PIC is of considerable magnitude and includes such items as [redacted] Microscopes, [redacted] Stereomicroscopes, [redacted] Comparator, [redacted] Stereocomparator, [redacted] Film Viewers, and many others.

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REFERENCE a.

b. Investigation demonstrates that each of these devices pose special viewing problems for those Intelligence Officers who are required to wear eyeglasses to achieve normal eyesight. These problems are caused by the design of the various viewing systems and result in a loss of efficiency to personnel who wear glasses. Two examples of the design features which result in efficiency losses are as follows:

(1) When the viewed image is focused at the plane of the viewing optics, a person wearing glasses can see only a portion of the available image. Such a condition requires a constant manual manipulation of the viewed material to permit complete observation, and creates the risk of failing to recognize significant relationships within an intelligence target area.

(2) Some instruments utilize rubber eyecups which make it impossible for a person wearing eyeglasses to see an image at the optimum plane of focus. In addition, these devices present images at relatively low light levels, and since a person wearing glasses cannot enclose his eyes within the eyecups, a considerable amount of sidelight impinges on his view tending to drown out low contrast detail.

c. In order to eliminate the loss of efficiency encountered by personnel wearing eyeglasses, two courses of action are available. The first of these would entail the modification of all tubular optical systems to overcome the limiting factors now affecting the visually handicapped. Such a solution would entail a very heavy money outlay and a considerable time loss for engineering and actual modifications. The second solution would entail equipping handicapped personnel with fitted contact lenses. This would be a more economical answer to the problem and would result in no loss of time for equipment modification.

d. Present medical experience seems to indicate that approximately 95% of those persons equipped with contact lenses experience little difficulty in becoming used to them. It should be further noted that contact lenses are equal to conventional eyeglasses in their vision correction ability. Contact lenses cost approximately $175 per person for fitting and purchase. Because of the high cost involved for an individual employee, it is felt that the Agency should bear the expense for those persons who are required to use these instruments to more efficiently perform their duties.

REFERENCE a.

~~SECRET~~
S E C R E T

4. RECOMMENDATION:

That PIC be authorized to purchase fitted contact lenses for personnel who must wear eyeglasses to achieve normal vision and who are required to use tubular optical devices in their work.

[redacted] 25X1

ARTHUR C. LUNDAHL
Director
graphic Intelligence Center

25X1 [redacted]

CONCUR: [redacted]
Deputy Director (Intelligence)

APPROVED: *
Deputy Director (Support)

* Concurrence is on 29 June Memo

TAB

REFERENCE b.

29 JUN 1960

MEMORANDUM FOR: Acting Director of Central Intelligence

SUBJECT: Contact Lenses for PIC Personnel

1. This memorandum contains a recommendation for action in paragraph 9 for the Acting Director of Central Intelligence.

2. Photographic Intelligence Center is utilizing, to an increasing extent, high magnification optical devices which cannot be operated effectively while the viewer is wearing ordinary eyeglasses. PIC has recommended, therefore, after study of the problem, that it be authorized to purchase contact lenses for certain personnel who are required to wear vision correctives to achieve normal vision and who operate these tubular optical devices in their work. The only alternative to contact lenses would entail the modification of all tubular optical systems requiring a very heavy money outlay and a considerable time loss for engineering and actual modifications.

3. At present there are approximately 20 PIC employees who would be fitted with contact lenses if approval is received. Such lenses cost approximately $175 per pair for fitting and purchase.

4. If approval is received, Medical Staff is of the opinion that it should retain a continuing control over each case in which such lenses are required. Medical Staff would conduct an initial examination to determine, where possible, whether the individual could wear contact lenses successfully. It would then refer employees it believed had excellent chances of successfully adapting to wearing contact lenses to local optometrists and ophthalmologists.

5. No restrictions would be placed on the employee's wearing the lenses while engaged in other than his official duties since such use would hasten his complete adaption to their continuous use.

6. There appeared to be a sufficient legal question for the Office of General Counsel informally to contact the General Accounting Office and seek its advice. [redacted] of GAO stated, after some research, that he believed there was a reasonable chance the Comptroller General would approve the use of appropriated funds for this purpose. He recommended, therefore, that in advance of any purchase a formal opinion be sought from the Comptroller General as to its legality.

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7. The attached letter has been prepared for the Acting Director's signature (as required by law) requesting such an opinion. In addressing the letter separately to the issues of those present employees requiring

REFERENCE b.

vision correctives and of future employees who might require such, this
25X1 Office is following [redacted] recommendation, based on the belief that, even if the Comptroller General were to hold in favor of expending appropriated funds for lenses for present employees, it is unlikely he would be able to extend this opinion to include future employees.

8. The problem has been stated in the letter to the Comptroller General in general terms in order to make the correspondence unclassified.

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9. It is recommended that the Acting Director of Central Intelligence sign the attached letter to the Comptroller General.

[redacted]
General Counsel

Attachment

CONCURRENCES:

25X1 [redacted]
Photographic Intelligence Center

29 June 1960
Date

25X1 [redacted]
Comptroller

29 June 1960
Date

25X1 [redacted]
Deputy Director (Support)

30 June 60
Date

Distribution:
Orig & 1 - OGC w/basic
1 - DCI
1 - DDCI
1 - ER
1 - DD/I
2 - DD/S
1 - PIC
1 - Compt
1 - Medical Staff

TAB

COPY

REFERENCE c.

2 Jul 1960

Honorable Joseph Campbell
The Comptroller General
of the United States
Washington 25, D. C.

Dear Mr. Campbell:

This Agency employs a number of highly trained specialists who use equipment in their work which requires either normal or corrected-to-normal vision. Many of these specialists require eyeglasses which they have in the past been able to wear while operating this special equipment. However, this Agency is replacing the equipment with new machinary of improved design which cannot be used effectively while the operator is wearing conventional eyeglasses.

The Agency has expended a great deal of time and money in the training of these specialists and has the desire neither to lose their services nor to impede their efficiency. It has been determined by a comprehensive study of the problem that those specialists requiring vision correctives could wear contact lenses successfully in operating the new equipment. It is believed proper that the Agency should purchase these lenses from appropriated funds.

The Agency's continuing replacement of its old equipment with the new, more efficient apparatus, capable of producing a finer quality of work, is creating new conditions which are making those seasoned employees, who were fully qualified when assigned originally to their specialized duties, increasingly unable to fulfill their assignments. To require these employees to purchase contact lenses would place an unique financial burden on them, since contact lenses are very costly in comparison with ordinary eyeglasses. Yet without such lenses these employees will soon become so ineffective as not to be able to continue in their specializations.

In short, since the operation of this new special equipment has become a necessary part of the duties of these experts which cannot be fulfilled while wearing ordinary eyeglasses, the Agency's mission in this special area can no longer be accomplished expeditiously and satisfactorily without fitting these employees with contact lenses. Therefore, it is felt that the Agency could justifiably purchase the lenses as an expense necessary to the efficient fulfillment of its mission.

It is my view that the special circumstances making contact lenses necessary in this case are unusual and do not describe a situation in which the employee can be expected to provide his own equipment as usual and necessary furnishings to enable him to perform the regular duties of the position for which he was engaged. Authority on this issue is found in 3 COMP GEN 433 (1524) and reaffirmed, in principle, in 32 COMP GEN 229 (1952):

> In the absence of specific authority for the purchase of personal equipment, particularly wearing apparel thereof, the first question for consideration in connection with a proposed purchase of such equipment is whether the object for which the appropriation involved was made can be accomplished as expeditiously and satisfactorily from the Government's standpoint without such equipment. If it be determined that use of the equipment is necessary to the accomplishment of the purposes of the appropriation, the next question to be considered is whether the equipment is such as the employee reasonably could be required to furnish as part of the personal equipment necessary to enable him to perform the regular duties of the position to which he was appointed or for which his services were engaged. Unless the answer to both of these questions is in the negative, public funds cannot be used for the purchase. In determining the first of these questions, there is for consideration whether the Government or the employee receives the principal benefit resulting from use of the equipment, and whether an employee reasonably could be required to perform the service without the equipment. In connection with the second question, the points ordinarily involved are whether the equipment is to be used by the employee in connection with his regular duties or only in emergencies or at infrequent intervals and whether such equipment is assigned to an employee for individual use or is intended for and actually to be used by different employees.

In view of these facts, this Agency requests your opinion, first whether it can purchase from appropriated funds contact lenses for experts who are assigned to operating this special new equipment, and second, whether any new employees trained for this specialized work, may also be supplied with contact lenses at Government expense.

Sincerely,

C. P. Cabell
General, USAF
Acting Director

TAB

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CENTRAL INTELLIGENCE AGENCY

OFFICIAL ROUTING SLIP

TO	NAME AND ADDRESS	INITIALS	DATE
1	[redacted]		
2	Assistant to the DCI D/DCI		8/12/60
3	DCI	8/11/60 →	
4	General Counsel		8/15/60
5			
6			

	ACTION		DIRECT REPLY		PREPARE REPLY
	APPROVAL		DISPATCH		RECOMMENDATION
	COMMENT		FILE		RETURN
	CONCURRENCE		INFORMATION		SIGNATURE

Remarks:

No reply to this letter or further action is indicated. Copies of the opinion have been disseminated to the interested components. We would like to recommend that the letter be brought to the attention of the Director and Deputy Director. Please return the original to Office of General Counsel thereafter for filing.

[redacted]

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FROM: NAME, ADDRESS AND PHONE NO.	DATE
Office of General Counsel 227 East Bldg.	7.28.60

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FORM NO. 1 APR 55 237 Replaces Form 30-4 which may be used. (40)

☆ U. S. GOVERNMENT PRINTING OFFICE : 1955 O-342531

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CENTRAL INTELLIGENCE AGENCY

OFFICIAL ROUTING SLIP

TO	NAME AND ADDRESS	INITIALS	DATE
1	DD/S		7/26/60
2	[redacted]		
3	Comptroller		
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X	ACTION		DIRECT REPLY		PREPARE REPLY
	APPROVAL		DISPATCH		RECOMMENDATION
	COMMENT		FILE		RETURN
	CONCURRENCE	X	INFORMATION		SIGNATURE

Remarks:

For information and necessary action. A copy of this letter has been sent to the DD/I for information.

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FROM: NAME, ADDRESS AND PHONE NO.	DATE
[redacted] Asst. to the DCI	7/22/60

UNCLASSIFIED | CONFIDENTIAL | SECRET

FORM NO. 237 Replaces Form 30-4 which may be used. (40)

1 APR 55 U.S. GOVERNMENT PRINTING OFFICE : 1955—O-542531

60-5666

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON 25

REFERENCE d.

B-143437

July 21, 1960

Honorable Allen W. Dulles
Director, Central Intelligence Agency

Dear Mr. Dulles:

A letter dated July 2, 1960, from the Acting Director, Central Intelligence Agency, concerns the use of appropriated funds to furnish contact lenses for certain employees of your Agency.

The Acting Director states that the Central Intelligence Agency employs a number of highly trained specialists who use equipment in their work which requires either normal or corrected-to-normal vision. He further states that many of the specialists require eyeglasses which they have in the past been able to use while operating this special equipment, but that your Agency is replacing this equipment with new machinery of improved design which cannot be used effectively while the operator is wearing conventional eyeglasses.

The Acting Director advises that the Central Intelligence Agency has expended a great deal of time and money in the training of these specialists and does not wish to lose their services or impede their efficiency. He reports that it has been determined by a comprehensive study of the program that those specialists requiring vision correctives could wear contact lenses successfully in operating the new equipment. The Acting Director's letter continues, in part:

> "The Agency's continuing replacement of its old equipment with the new, more efficient apparatus, capable of producing a finer quality of work, is creating new conditions which are making these seasoned employees, who were fully qualified when assigned originally to their specialized duties, increasingly unable to fulfill their assignments. To require these employees to purchase contact lenses would place an undue financial burden on them, since contact lenses are very costly in comparison with ordinary eyeglasses. Yet without such lenses these employees will soon become so ineffective as not to be able to continue in their specializations.
>
> "In short, since the operation of this new special equipment has become a necessary part of the duties of these experts which cannot be fulfilled while wearing ordinary eyeglasses, the Agency's mission in this special area can no longer be accomplished expeditiously and satisfactorily without fitting these employees with contact

B-143437

lenses. Therefore, it is felt that the Agency could justifiably purchase the lenses as an expense necessary to the efficient fulfillment of its mission.

The Acting Director is of the view that the special circumstances making contact lenses necessary in this case are unusual and do not describe a situation in which the employee can be expected to provide his own equipment as usual and necessary furnishings to enable him to perform the regular duties of the position for which he was engaged. He cites in connection with the matter 3 Comp. Gen. 433 as reaffirmed in principle by 32 Comp. Gen. 229.

In view of the above facts our decision is requested first, as to whether your Agency can purchase from appropriated funds contact lenses for experts who are assigned to operate this special equipment, and second, whether any new employees trained for the specialized work may also be supplied with contact lenses at Government expense.

As indicated in the Acting Director's letter we reaffirmed, in principle, in 32 Comp. Gen. 229 the following language appearing in 3 Comp. Gen. 433:

"In the absence of specific statutory authority for the purchase of personal equipment, particularly wearing apparel or parts thereof, the first question for consideration in connection with a proposed purchase of such equipment is whether the object for which the appropriation involved was made can be accomplished as expeditiously and satisfactorily from the Government's standpoint, without such equipment. If it be determined that use of the equipment is necessary in the accomplishment of the purposes of the appropriation, the next question to be considered is whether the equipment is such as the employee reasonably could be required to furnish as part of the personal equipment necessary to enable him to perform the regular duties of the position to which he was appointed or for which his services were engaged. Unless the answer to both of these questions is in the negative, public funds cannot be used for the purchase. In determining the first of these questions there is for consideration whether the Government or the employee receives the principal benefit resulting from use of the equipment and whether an employee reasonably could be required to perform the service without the equipment. In connection with the second question the points ordinarily involved are whether the equipment is to be used by the employee in connection with his regular duties or only in emergencies or at infrequent intervals and whether

such equipment is assigned to an employee for individual use or is intended for and actually to be used by different employees."

Applying the tests or criteria set forth in the above-quoted language, it is clear from the facts in the Acting Director's letter that the work involved here can be accomplished expeditiously and satisfactorily from the Government's standpoint without contact lenses if the employees doing the work have normal vision without eyeglasses, and that such employees reasonably could be required to perform the work involved without contact lenses. Moreover, the contact lenses apparently are to be used by the employee in his regular duties, as distinguished from emergencies or at infrequent intervals, and apparently will be assigned to the employee for his individual use both on and off the job and will not and, of course, cannot be used by other employees. It is our view that under such circumstances contact lenses are equipment such as an employee could reasonably be required to furnish as part of the personal equipment necessary to enable him to perform the regular duties of the position for which his services were engaged, particularly when it is known beforehand (i.e., before the person is employed or engaged for such duties) that the equipment he is to operate cannot be used effectively by a person wearing conventional eyeglasses but only by a person whose vision is normal without glasses or a person who wears contact lenses.

In view, however, of the special facts and circumstances in the instant case and taking into consideration the fact that your Agency has expended a great deal of time and money in training these specialists, we would not object to the use of appropriated funds to purchase the initial set of contact lenses for those highly trained specialists (i.e., the "seasoned employees") who were fully qualified when assigned originally to their specialized duties. The first question presented is answered accordingly.

As to the second question, in view of what we have said above, new employees who are engaged to be trained for the specialized work involved here may not be supplied with contact lenses at Government expense. As indicated above, contact lenses would appear to be equipment that new employees who require vision correctives could reasonably be required to furnish as part of the personal equipment necessary to enable them to qualify for, and perform the regular duties of, the position for which their services were engaged. The second question is answered accordingly.

Also, it is our view that if you desire to provide replacement of contact lenses furnished to your present employees or to supply contact lenses to new employees, specific statutory authority should be obtained.

Sincerely yours,

[redacted]

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Comptroller General
of the United States

TAB

REFERENCE e.

STAFF STUDY

EYEPOINT OF WIDE-FIELD HIGH-POWER ANAMORPHIC STEREOVIEWER

1. THE PROBLEM:

To devise a method that will permit photo-interpreters who normally wear eyeglasses to view through the Wide-Field, High-Power Anamorphic Stereoviewer.

2. FACTS BEARING ON THE PROBLEM:

a. NPIC has contracted with [redacted] for the design and fabrication of a prototype Wide-Field, High-Power Anamorphic Stereoviewer. Essentially, the purpose of this program is to develop a microstereoscope with a substantially larger field-of-view than the High-Power Stereoviewer presently being employed at NPIC. 25X1

25X1 b. [redacted] has determined that the parameters governing the eyepoint (the distance between the eyepiece and the eye) and the field-of-view are not independent. A design compromise had to be made which established the diameter of the apparent field-of-view at 350 mm and an effective eyepoint of only 16 mm. This eyepoint is totally sufficient for people who do not wear eyeglasses.

c. For operators who wear glasses an eyepoint of no less than 20 mm needs to be provided. The preferable distance is 25 mm.

d. Because the eyeglass lens dictates the position of the eye relative to the eyepoint of the microscope, it is currently impossible to use glasses and still see the entire field of view; thus with the Wide-Field, High-Power Stereoviewer, almost all of the additional field size that is being gained by developing this instrument will be lost to those who wear eyeglasses.

e. An extensive survey was made of the photo-interpreters and photogrammetrists in NPIC; it was determined that 62% wear glasses. Of the 174 individuals surveyed, 74% continue to wear their glasses when viewing through a microscope.

f. By utilizing a different design, the eyepoint could be lenghtened, but this would significantly reduce the size of the field-of-view to the point that a realistic justification for the entire project would be rather difficult.

3. DISCUSSION:

One of the most prevalent complaints regarding existing direct viewing devices employed by the Center has been their limited field-of-view. To date, this limitation has been dictated by the previous optical state-of-the-art, in that no one in the industry could design an optical system with a wide field-of-view that was flat and still possessed image quality characteristics equal to that of the best existing microscopes. The difficulty of this optical design task (a wide, flat field) cannot be over-emphasized. The optical industry has been striving for years to increase the field-of-view of their microscopes because of a large commercial demand, however, they have been without success. Only recently have optical design techniques together with new, computer assisted, design programs been developed that would permit the industry to seriously attempt to design a system of this complexity.

The object of the Wide-Field, High-Power Anamorphic Stereoviewer development project is to develop a microstereoscope with the largest flat field-of-view possible, yet the instrument must, of course, permit a photo-interpreter to view through the system. Glenn A. Fry, School of Optometry, the Ohio State University, in his article "The Eye and Vision" in Applied Optics and Optical Engineering, states that the spectacle point -- that distance between the front surface of the eye's cornea and the back surface of the eyeglass lens -- should be 14 mm. The eye relief point is placed approximately 3.0 mm behind the front surface of the cornea for proper viewing as shown in Figure 1. Figure 2 shows this relationship when eyeglasses are worn. From this figure it can be seen that an operator wearing eyeglasses cannot position his eye at the proper viewing point because of the interference between the eyeglass lens and the microscope's eyepiece.

The specific problem of not being able to see the entire field-of-view while wearing eyeglasses does exist to a very slight degree in some existing instruments and some photo-interpreters currently do remove their eyeglasses, while viewing through these instruments, to insure that they achieve a maximum field-of-view. However, because of the inherently small field-of-view available, the field is only further restricted, when wearing glasses, by a very small percentage of its total. Of the 146 photo-interpreters at NPIC who wear eyeglasses, a large number -- 48% -- of these individuals claimed that it was an extreme hardship to put their eyeglasses on each time they wanted to look away from the microscope -- to write something, look at maps or other materials. This is reasonable, since the photo interpretation process continuously requires them to operate in this manner. The eyesight of some individuals is so bad that they can see very little if they do not wear their eyeglasses when they look away from the scope,

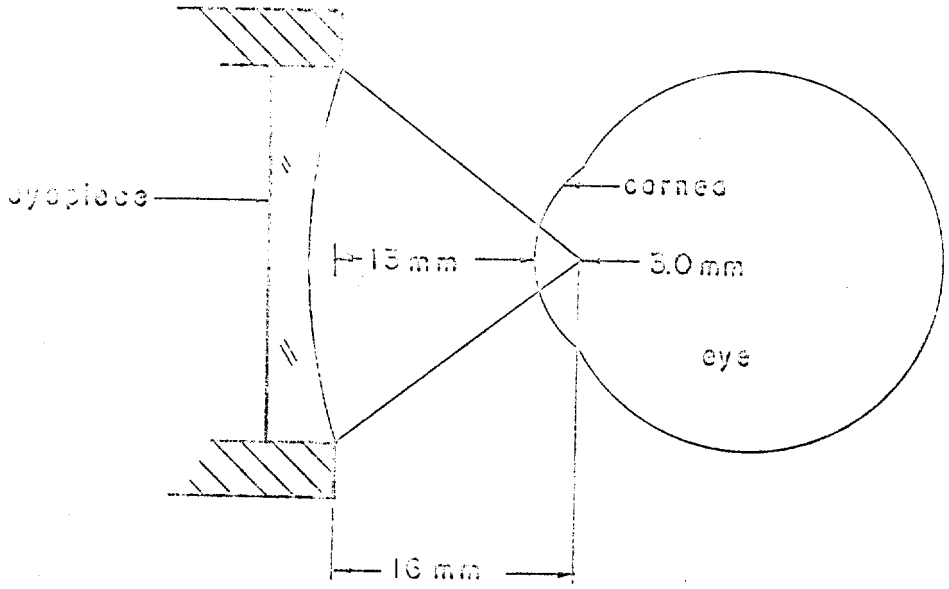

Figure 1

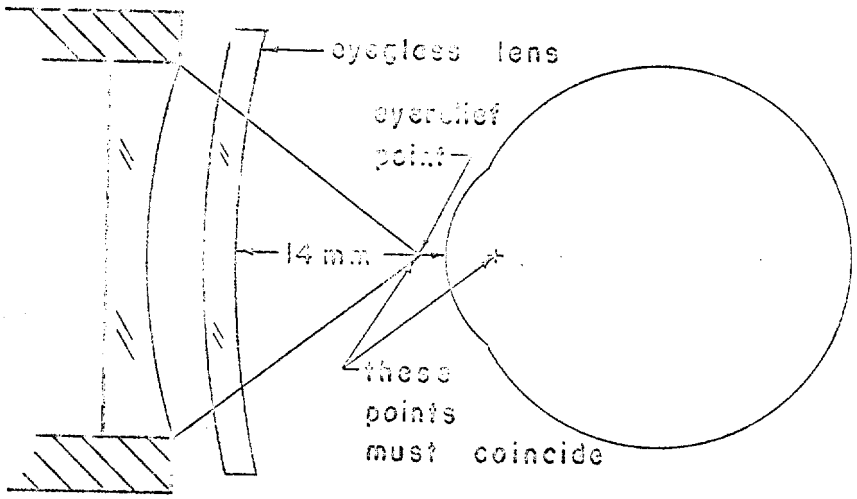

Figure 2

and one individual said that his eye doctor had instructed him to [illegible] his eyeglasses when looking through optical systems. The basis for the development of this wide-field viewer was to develop an instrument with the largest useable field-of-view possible, and that is precisely what the 350 mm diameter apparent field yeilds. This configuration should be entirely satisfactory for those P.I.'s who do not wear eyeglasses. It would, therefore, be unacceptable to significantly compromise the design of the instrument -- by decreasing the field size -- if another alternative could be found for those individuals who cannot take advantage of this field size increase because they wear eyeglasses.

4. CONCLUSIONS:

Because the new Wide-Field, High-Power Anamorphic Stereoviewer will not permit viewing of the entire field-of-view by those individuals who wear glasses, some alternative solution must be determined. Listed below are some of the available alternatives:

a. Provide prescription contact lenses for all individuals that will accept them. This would completely solve the problem for most P.I.'s except some individuals who have extreme astigmatism. A new type of contact lens (trademark - 'soflens') has recently been developed, and is being tested that would almost completely eliminate the current difficulty of learning how to wear them. For those who are either extremely astigmatic or do not want to use contact lenses, another solution must be found.

b. Design a special eyepiece for use by those who wear eyeglasses with a longer eyepoint. B&L has given a preliminary estimate that such an eyepiece can be designed with a 21 mm eyepoint which is long enough for eyeglass wearers, but the diameter of the field-of-view will consequently be reduced by at least 30%. This is certainly a serious penalty to pay, however, the instrument would still have a diameter of the field-of-view about 22% greater than the best of our existing instruments. This alternative would allow those with extreme astigmatic eyeglass correction to utilize their eyeglasses.

c. Purchase the Wide-Field, High-Power Anamorphic Stereoviewer only for those individuals who do not wear eyeglasses. This appears to be an unrealistic alternative because over half of the P.I.'s wear eyeglasses.

Because the Wide-Field, High-Power Anamorphic Stereoviewer has such a vast potential of increasing the efficiency and effectiveness of the photo interpretation process, it would be extremely unwise to limit its usefulness to non-eyeglass wearing operators.

5. RECOMMENDATIONS:

It is, therefore, recommended that:

a. NPIC establish a policy of providing contact lenses to all operators of microscopic type equipment whose eyes require such correction. This policy would offer them only to those who desire to use them.

1. In conjunction with the above recommendation, it is further recommended that the Office of Medical Services investigate the applicability of employing the new [redacted] "Softlens". 25X1

2. If it is determined that the "Softlens" is not suitable or does not offer an advantage, then it is recommended that the existing plastic contact lenses be offered to the operators.

b. If the above recommendation, which is the best alternative solution to the problem, is rejected -- or possibly in addition for those who do not elect to take the contact lenses -- then a program to develop an additional special eyepiece with a longer eyerelief be initiated. Such a longer eyepoint eyepiece development program would cost approximately [redacted] However, it must be realized that contact lenses could prove cheaper and more effective in the long run. 25X1